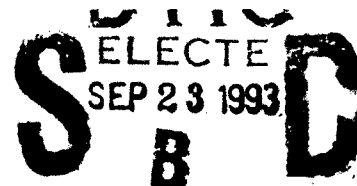


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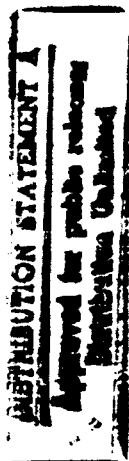
SHORT COMMUNICATION



Association of Ticks (Acari: Ixodoidea) with Rodent Burrows in Northern Senegal

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ABSTRACT Four species of ticks were retrieved from burrows of 64 multimammate rats, *Mastomys erythroleucus* (Temminck), 55 gerbils, *Taterillus gracilis* (Thomas) or *T. pygargus* (Cuvier), 13 Nile rats, *Arvicanthus niloticus* (DeMarest), and five Geoffroy's ground squirrels, *Xerus erythropus* (Geoffroy) from May 1987 through August 1988 at two study sites in northern Senegal. *Ornithodoros sonrai* Sautet & Witkowski were recovered from 95% (74/78) of burrows near Bandia and 6% (4/66) of burrows near Yonofere. Eight *Hyalomma truncatum* Koch, four *Rhipicephalus guilhon* Morel & Vassiliades, and one *R. sulcatus* Neumann were recovered from 144 rodent burrows (nine tick-positive burrows) from both locations. No seasonal trend of tick abundance or activity was noted, nor was any pattern of burrow preference by ticks detected. Rodent burrows in either location appeared to be little used by ixodid ticks.

KEY WORDS rodent-tick associations, *Hyalomma*, *Ornithodoros*

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THE TICK FAUNA of rodent burrows in the semi-desert ecotype, which serves as habitat for many species of *Hyalomma* ticks, remains poorly understood (Hoogstraal 1973). Field surveys to collect ticks from this harsh environment of high temperatures and low humidity often produce large numbers of *Hyalomma* spp. attached to animals but few, if any, free-living ticks collected from soil or vegetation. Efforts to capture ticks by CO₂ trapping, flagging, or walking techniques, known to be effective for many ixodid species, are almost never productive (unpublished data). During the drier periods of the year, surface vegetation that should provide suitable habitat for ticks is sparse; yet domestic ungulates in these same areas support heavy tick burdens (Camicas et al. 1990, Wilson et al. 1990). Rodents serve as hosts to the immature stages of many of these species; furthermore, rodent burrows would seem to provide a more suitable microhabitat of higher humidity and buffered temperature extremes for ixodid ticks. Therefore, we conducted a study designed to locate free-living ticks associated with the burrows of various species of rodents in northern Senegal.

Materials and Methods

Rodent burrows were excavated systematically throughout the year at two long-term study sites selected to study Crimean-Congo hemorrhagic fever (CCHF) virus (Wilson et al. 1990). Six rodent burrows were excavated monthly near the northern Senegal villages of Yonofere (15° 14' N, 14° 29' W) in the Sahelo-Sudanian bioclimatic zone, and Bandia (14° 37' N, 17° 01' W) in the Sudanian bioclimatic zone. The burrow entrance, tunnels, and all chambers were opened and the contents were sampled using a trowel, spade, and gasoline-powered aspirator. The aspirator was created by modifying a hand-held leaf blower by reversing the direction of air flow, elongating the uptake with a flexible tube, and adding filters (Butler & Gibbs 1984). These filters separated suctioned materials and allowed sand and debris to pass while trapping nymphal and adult ticks. The aspirator tube was used to suction loose material from the tunnel entrance before soil that formed the tunnels and chambers of each burrow was broken carefully and removed during aspiration. In this manner, we systematically removed and filtered the contents of tunnels and chambers in each burrow.

The rodent species that most recently inhabited the burrow was inferred from assessing the size and shape of fecal pellets when found within, as well as the location, depth, and structure of the burrow. Ixodid ticks found in burrows were counted individually. The argasid tick *Or-*

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Table 1. Ixodid ticks captured in rodent burrows excavated near Bandia and Yonofere, Senegal, during May 1987–August 1988

| Date | No. ticks from rodent burrows in ^a | | | | |
|----------------|---|------------|------------|------------|-------|
| | Me | An | Tg | Xe | Un |
| Bandia | | | | | |
| 1987 | | | | | |
| May | ♂ 1 Ht (6) | — | — | — | — |
| June | ♂ 1 Ht (4) | — | 0 (1) | ♂ 2 Ht (1) | — |
| | ♂ 1 Rg | — | — | — | — |
| July | ♂ 1 Rs (3) | 0 (2) | 0 (1) | — | — |
| Aug. | 0 (5) | — | — | — | 0 (1) |
| Sept. | 0 (4) | 0 (1) | 0 (1) | — | — |
| Oct. | 0 (4) | ♂ 1 Ht (2) | — | — | — |
| | | ♂ 2 Rg | — | — | — |
| 1988 | | | | | |
| Feb. | ♂ 1 Rg (5) | 0 (1) | — | — | — |
| March | 0 (3) | — | 0 (1) | — | — |
| April | 0 (6) | — | — | — | — |
| May | 0 (2) | 0 (3) | 0 (1) | — | — |
| June | 0 (4) | 0 (1) | 0 (1) | — | — |
| July | 0 (4) | 0 (2) | — | — | — |
| Aug. | 0 (5) | 0 (1) | — | — | — |
| Total Bandia | 2 Ht (55) | 1 Ht (13) | 0 (8) | ♂ Ht (1) | 0 (1) |
| | 2 Rg | 2 Rg | — | — | — |
| | 1 Rs | — | — | — | — |
| Yonofere | | | | | |
| 1987 | | | | | |
| May | 0 (5) | — | — | 0 (1) | — |
| June | — | — | 0 (6) | — | — |
| July | — | — | ♂ 2 Ht (5) | 0 (1) | — |
| Aug. | — | — | — | — | 0 (6) |
| Sept. | — | — | 0 (6) | — | — |
| Oct. | — | — | 0 (6) | — | — |
| Nov. | 0 (1) | — | 0 (5) | — | — |
| Dec. | 0 (1) | — | 0 (4) | 0 (1) | — |
| 1988 | | | | | |
| Jan. | — | — | — | — | — |
| Feb. | — | — | 0 (6) | — | — |
| March | 0 (1) | — | 0 (4) | 0 (1) | — |
| April | 0 (1) | — | 0 (5) | — | — |
| Total Yonofere | 0 (9) | — | 2 Ht (47) | 0 (4) | 0 (6) |

^a Ticks: Ht, *Hyalomma truncatum*; Rg, *Rhipicephalus guilhoni*; Rs, *R. sulcatus*. Rodent burrows: Me, *Mastomys erythroleucus*; An, *Arvicanthis niloticus*; Tg, *Taterillus gracilis* or *T. pygargus*; Xe, *Xerus erythropus*; Un, unknown.

nithodoros sonrai Sautet & Witkowski was assessed as either abundant (>10), sparse (<10), or none per burrow.

Results and Discussion

In total, 144 rodent burrows were examined from May 1987 through August 1988 (Table 1). These burrows were determined to have been inhabited by multimammate rats, *Mastomys erythroleucus* (Tenison-Woods) ($n = 64$); gerbils of the genus *Taterillus* ($n = 55$) (either *T. gracilis* (Thomas) or *T. pygargus* (Cuvier), which cannot be separated without chromosomal analysis); Nile rats, *Arvicanthis niloticus* (Demarest) ($n = 13$); and Geoffroy's ground squirrels, *Xerus erythropus* (Geoffroy) ($n = 5$). Seven burrows were recorded as unknown because there was no distinct, recognizable evidence as to the inhabiting rodent species. Excavation of 78 burrows near Bandia and 66 burrows near Yonofere yielded 11 and 2 adult ixodid ticks, respectively (Table 1). These included eight *Hyalomma truncatum* Koch, four *Rhipicephalus guilhoni* Morel

& Vassiliades, and one *R. sulcatus* Neumann. *Hyalomma truncatum* were found in burrows of all four rodent genera. *R. guilhoni* were found in *Mastomys* and *Arvicanthis* burrows, and *R. sulcatus* was found in a *Mastomys* burrow (Table 1). The small numbers of ixodids recovered from burrows in this region indicate that adult ticks do not extensively use rodent burrows during non-parasitic phases, even in this harsh ecotype. Rodent-fed immatures that detach in burrows apparently begin above-ground host-seeking soon after molting.

Ornithodoros sonrai was widespread and common near Bandia and to a lesser extent in Yonofere (Table 2). We found that this soft tick was abundant in burrows of all rodent genera that we excavated in Bandia (95% of burrows infested). In Yonofere, however, only 6% (4/66) of rodent burrows contained *O. sonrai*, and these had only sparse infestations. *O. sonrai* were found in *Taterillus* and *Xerus* burrows (4/51) but not in *Mastomys* burrows (0/9); no *Arvicanthis* burrows were sampled near Yonofere (Table 2). There were many more *O. sonrai* in burrows

Table 2. *Ornithodoros sonrai* ticks captured in rodent burrows excavated near Bandia and Yonofere, Senegal, during May 1987–August 1988

| Date | Tick abundance from rodent burrows on ^a | | | | |
|----------------|--|--------|--------|-------|-------|
| | Me | An | Tg | Xe | Un |
| Bandia | | | | | |
| 1987 | | | | | |
| May | A (6) | — | — | — | — |
| June | A (4) | — | A (1) | A (1) | — |
| July | A (3) | A (2) | A (1) | — | — |
| Aug. | A (5) | — | — | — | A (1) |
| Sept. | A (3) | A (1) | A (1) | — | — |
| | N (1) | — | — | — | — |
| Oct. | A (4) | A (2) | — | — | — |
| 1988 | | | | | |
| Feb. | A (5) | A (1) | — | — | — |
| March | A (2) | — | A (3) | — | — |
| | N (1) | — | — | — | — |
| April | A (4) | — | — | — | — |
| | N (2) | — | — | — | — |
| May | A (2) | A (5) | A (1) | — | — |
| June | A (4) | A (1) | A (1) | — | — |
| July | A (4) | A (2) | — | — | — |
| Aug. | A (5) | A (1) | — | — | — |
| Total Bandia | A (51) | A (13) | A (8) | A (1) | A (1) |
| | N (4) | — | — | — | — |
| Yonofere | | | | | |
| 1987 | | | | | |
| May | N (5) | — | — | S (1) | — |
| June | — | — | N (6) | — | — |
| July | — | — | N (5) | N (1) | — |
| Aug. | — | — | — | — | N (6) |
| Sept. | — | — | N (5) | — | — |
| | — | — | S (1) | — | — |
| Oct. | — | — | N (6) | — | — |
| Nov. | N (1) | — | N (5) | — | — |
| Dec. | N (1) | — | N (3) | N (1) | — |
| | — | — | S (1) | — | — |
| 1988 | | | | | |
| Jan. | — | — | — | — | — |
| Feb. | — | — | N (5) | — | — |
| | — | — | S (1) | — | — |
| March | N (1) | — | N (4) | N (1) | — |
| April | N (1) | — | N (5) | — | — |
| Total Yonofere | N (9) | — | N (44) | N (3) | N (6) |
| | — | — | S (3) | S (1) | — |

^a A, abundant (>10); S, sparse (1–10); N, None. Rodent burrows: Me, *Mastomys erythroleucus*; An, *Arvicanthus niloticus*; Tg, *Taterillus gracilis* or *T. pygargus*; Xe, *Xerus erythropus*; Un, Unknown.

near Bandia compared with Yonofere. This is likely related to the comparatively large number of rodents present in the more moist and vegetated Sudanian bioclimatic zone where Bandia is located. No seasonal trend in *O. sonrai* abundance or activity, or in preference for burrows of any particular rodent species, was detected; each of these rodents appeared to be a suitable host for *O. sonrai*.

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